Perchlorate Q&A

What are the health effects of perchlorate?

Perchlorate interferes with the normal function of the thyroid gland and thus has the potential to affect growth and development and could cause brain damage and other adverse effects, particularly in fetuses and infants.

Why did MA DEP choose to address perchlorate risk?

In April 2002, the Bourne Water District (BWD) asked MA DEP for guidance on perchlorate, after the compound was detected in their wells. To date, no drinking water standard had been set by the either the U.S. Environmental Protection Agency (USEPA) or the state. Given the seriousness of the potential adverse effects associated with perchlorate and the fact that children were at risk, combined with uncertainty over the schedule of federal efforts to establish a drinking water standard for perchlorate, MA DEP provided interim guidance to the BWD and initiated the standard setting process.

What is MA DEP Currently Recommending Regarding Perchlorate in Drinking Water?

MA DEP scientists have issued interim guidance that perchlorate levels in drinking water above 1 part per billion (ppb) are of concern to sensitive individuals including pregnant women, infants, children and individuals with hypothyroidism. MA DEP recommends that these individuals not consume water with perchlorate slightly above 1 ppb for periods greater than 3-4 weeks. Consumption of water above this level or for longer periods will not necessarily result in adverse effects, but does create a risk to fetuses and children. In situations where drinking water exceeds this interim guideline value, sensitive members of the population are to be notified not to consume the water. MA DEP is also recommending that when perchlorate concentrations in public water supplies exceed 18 ppb, that no one should consume the water.

Can I use water contaminated with perchlorate for bathing and showering?

Showering and bathing with perchlorate-contaminated water is not a problem as perchlorate is not volatile and also is not absorbed through the skin.

What perchlorate standards are being set by MA DEP?

MA DEP's plan is to set a reference dose (RfD) for perchlorate, which is an estimated dose to which a person can be exposed without appreciable adverse health risk. MA DEP is also establishing hazardous waste site cleanup standards for perchlorate under the Massachusetts Contingency Plan or MCP (MGL Chapter 21E), and may also set a drinking water standard or Maximum Contaminant Level (MCL), depending on the results of testing for perchlorate in Massachusetts's water supplies.

Why is it necessary for MA DEP to set perchlorate standards?

MA DEP is establishing perchlorate standards to ensure that public health is protected and to facilitate the cleanup of perchlorate sources.

What are the values of MA DEP's proposed standards?

MA DEP is proposing an RfD of 3×10^{-5} mg/kg-day to be used in site-specific risk assessments. MA DEP's proposed MCP groundwater cleanup standard, based on this RfD, is 1.0 ppb. At this time, MA DEP has not proposed an MCL but has interim drinking water guidance for perchlorate, namely that sensitive subpopulations are advised not to drink the water with perchlorate levels greater than 1.0 ppb and that no one should consume drinking water with levels greater than 18 ppb.

How did MA DEP develop these standards?

As indicated in MA DEP's draft report *Perchlorate, Toxicological Profile And Health Assessment* (http://www.mass.gov/dep/ors/files/chemical.htm) and external scientific peer review discussions, MA DEP is proposing an RfD value of 3×10^{-5} mg/kg-day. This RfD would result in a drinking water limit of 1.0 ppb or lower for sensitive individuals if a relative source contribution factor were applied. A relative source contribution factor (RSC) effectively lowers the exposure from drinking water to keep the total exposure below the RfD accounting for non-drinking water related exposures (e.g. as might occur from the consumption of perchlorate contaminated foods such as lettuce, which has been shown to take up perchlorate if it is present in irrigation water). MA DEP uses a default value of 20% (typically ranges from 20-80%) unless specific information exists that supports an alternative value. An RCS of 20% reduces the drinking water limit to 0.2 ppb; however since the method reporting limit is 1 ppb, MA DEP would likely propose 1.0 ppb as a drinking water limit. A final MCL value considers health risks along with technologies for lowering perchlorate in water and the costs of monitoring and treatment and may differ from the health based number.

What is the US EPA doing on perchlorate?

The USEPA has completed an extensive draft perchlorate health assessment document, which has undergone external scientific peer reviews. This draft document recommends a reference dose of 3×10^{-5} mg/kg-day and an associated drinking water limit of 1 part per billion (ppb) (not allowing for any source apportionment, which if applied would result in a limit below 1 ppb). The draft document is being reviewed by the National Academy of Sciences (NAS) and will serve as the basis of future USEPA regulatory efforts on this chemical. The NAS review, revisions to the USEPA health assessment and the ultimate derivation of a national drinking water standard for perchlorate could well take years to complete.

Why isn't MA DEP waiting for the National Academy of Science (NAS) to complete its review of USEPA's perchlorate health assessment before setting standards?

MA DEP started its work to collect data on perchlorate and to set standards prior to the decision for the USEPA's draft assessment to be reviewed by NAS. MA DEP will take the NAS's review into account in its MCL standard setting process if it is ready and on schedule (scheduled for September 2004).

MA DEP is setting the interim perchlorate guidance at a level that is close to the detection limit for water. Isn't this problematic?

MA DEP does not view this as a problem. MA DEP's Wall Experiment Station has reviewed the analytical testing protocol for perchlorate and has approved 7 laboratories to perform the analysis. The method detection limit (MDL) is as low as 0.1 to 0.2 ppb with a method reporting limit (MRL) of 1.0 ppb. Several drinking water MCLs have MRLs only 2 times the MDL, whereas in the case of perchlorate the MRL is 5 times the MDL. Finally, it is important to note that there are several other chemicals in addition to perchlorate for which drinking water guidance or standards have been set at the method reporting limit.

How will decisions be made about perchlorate drinking water contamination?

MA DEP's Drinking Water Program has developed a protocol that includes for public water supplies confirmatory sampling and verification of analytical results by MA DEP when levels exceed 1.0 ppb. MA DEP will work with the laboratories and water suppliers to ensure valid test results prior to a determination that notification to sensitive subgroups is needed.

Why is MA DEP setting interim guidance for drinking water at 1 ppb for sensitive individuals while California is recommending 6 ppb for everyone?

MA DEP's interim guideline for perchlorate was derived using a weight of the evidence approach, where the available data on perchlorate toxicity was critically evaluated for consistency and biological plausibility in order to derive an RfD that is appropriately health protective for all members of the population. The California Environmental Protection Agency's (CA EPA) public health goal for perchlorate is based on a an experimental study by Greer et al, in which a small number of healthy ***adults*** ingested perchlorate for a relatively short period of 14 days. The study measured how perchlorate at various levels inhibited the uptake of iodide by the thyroid gland. MA DEP also used results from this study in its perchlorate assessment. However, MA DEP concluded that this study alone, because of its limited nature, did not provide a sufficient basis for establishing a final toxicity value. By more thoroughly accounting for the uncertainties in the Greer study when extrapolating to the general population, including pregnant women and infants, and integrating results from other studies on fetal and neonatal development in the assessment, MA DEP scientists derived a lower acceptable exposure value for sensitive individuals.

A more detailed discussion of the differences between the MA DEP and CA EPA derivations is presented on MA DEP's web page at:
http://www.mass.gov/dep/ors/files/chemical.htm.

Will there be opportunities for commenting on MA DEP's recommended standards?

Yes. The recommended RfD and MCP cleanup standards will be issued with MA DEP's proposed revisions to the MGL Chapter 21E regulations and will undergo additional public review. MA DEP will address comments received during the regulatory comment period before adopting a final RfD and standards for cleaning up waste sites. There will also be a similar public comment should MA DEP propose an MCL.